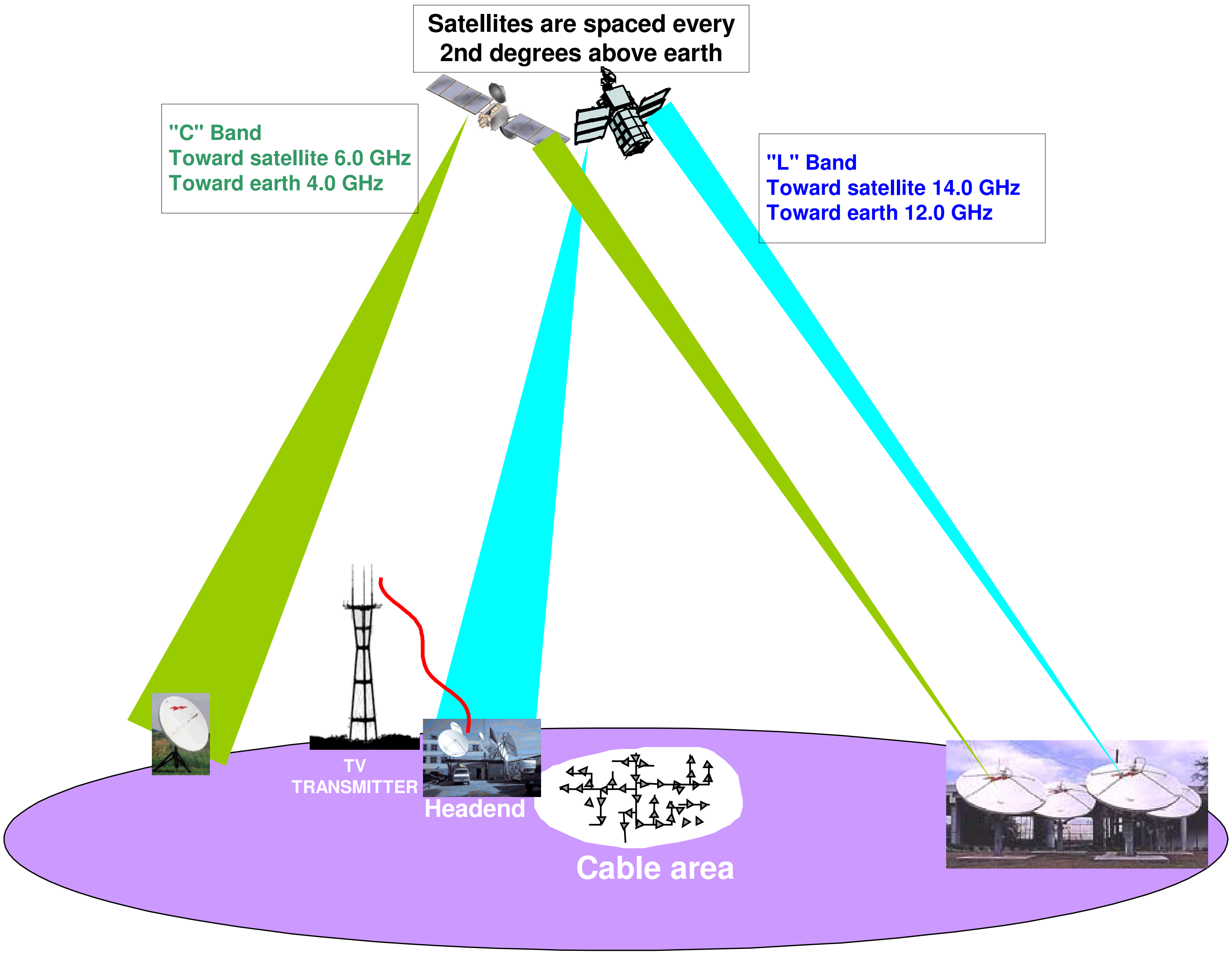
Broadband System - E



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Passive equipments.

Passive Equipment in a Broadband System.

All equipments required on a CATV, HFC or Broadband system that are not amplifying signals are called passives equipments. They fall in the following group;

•AC Power supply.

•Power inserter.

•Coaxial Splitter - Coupler.

•Multitap.

•Coaxial connectors.

•Equalizer.

•Attenuator.

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Passive Equipment in a Broadband System.

POWER SUPPLY.

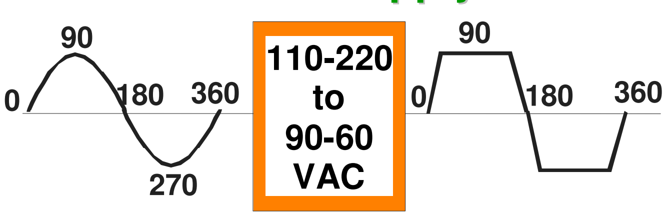
•The power supply's function is to convert 110 or 220 Volts AC, 60 Hertz sine wave, to either 60 or 90 Volts AC 60 Hertz square wave.

•The power supply can transform directly the 110 or 220 VAC supplied by the power company, to 60 or 90 volts AC. These are called Non-Standby power supply.

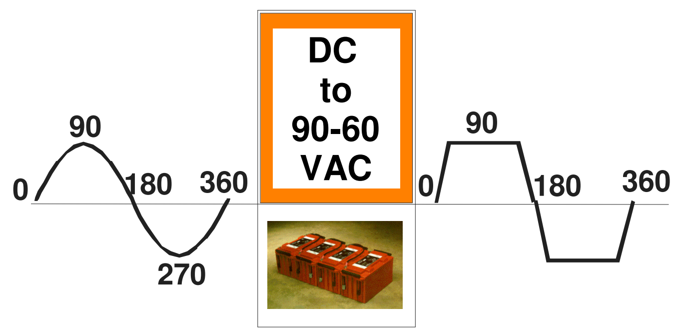
• Standby Power Supplies are equipped with 3, 4 or 8 batteries, and keep the Broadband system operating, when the power company no longer supplied 110 or 220 VAC.

•Stand-by Power Supply comes in two types, UPS or Switch Mode. UPS supplies voltage to the system at all time, where Switch Mode have a very short delay before going to battery operation.

Non standby
Power supply



Standby
Power supply



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Passive Equipment in a Broadband System.

Non standby
Power supply



UPS Standby
Power supply

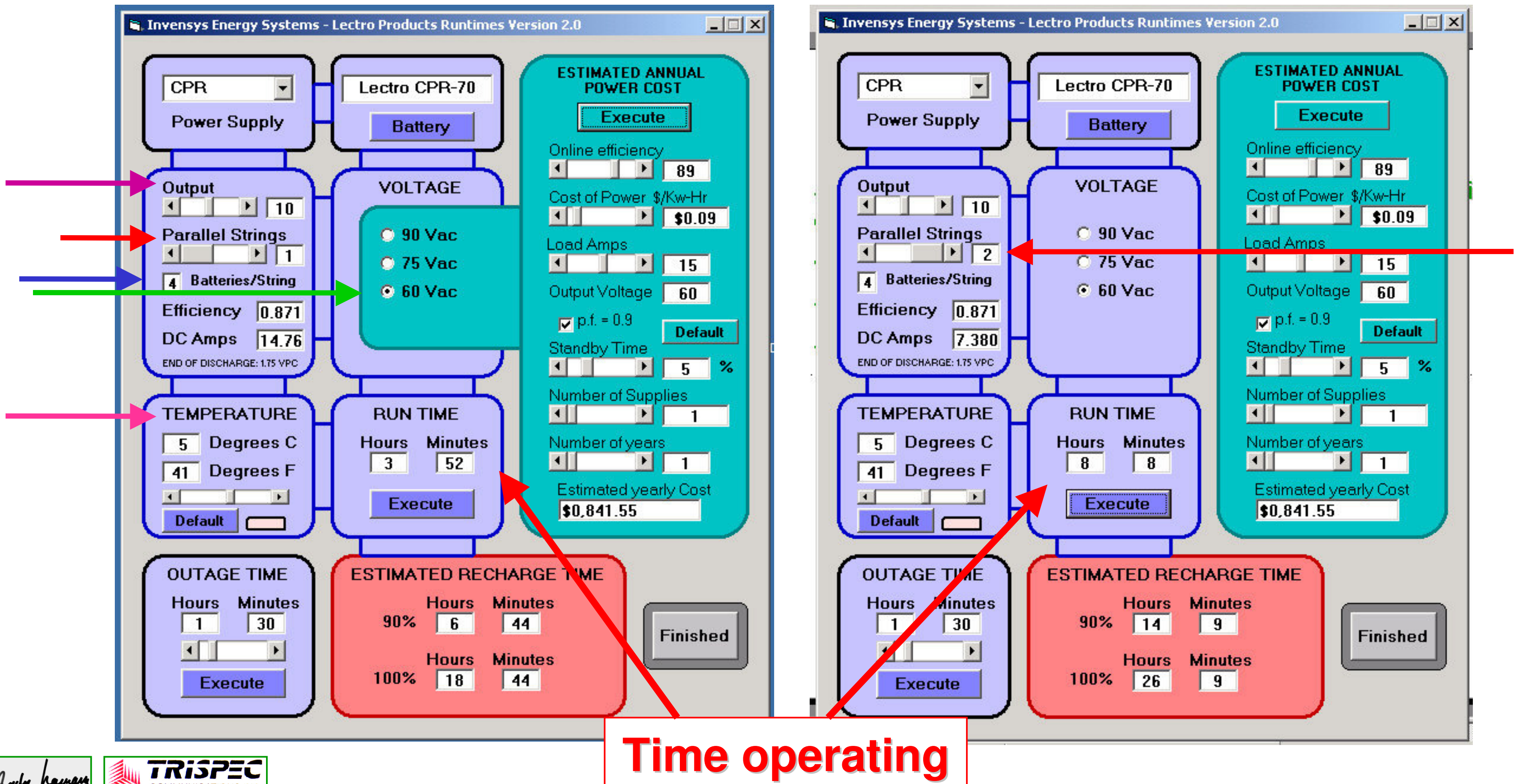


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Passive Equipment in a Broadband System

Standby Power Supply will keep the system operating on standby mode depending of the following:

- **Current draw from the system.**
- **Number of batteries installed.**
- **The operating temperature.**

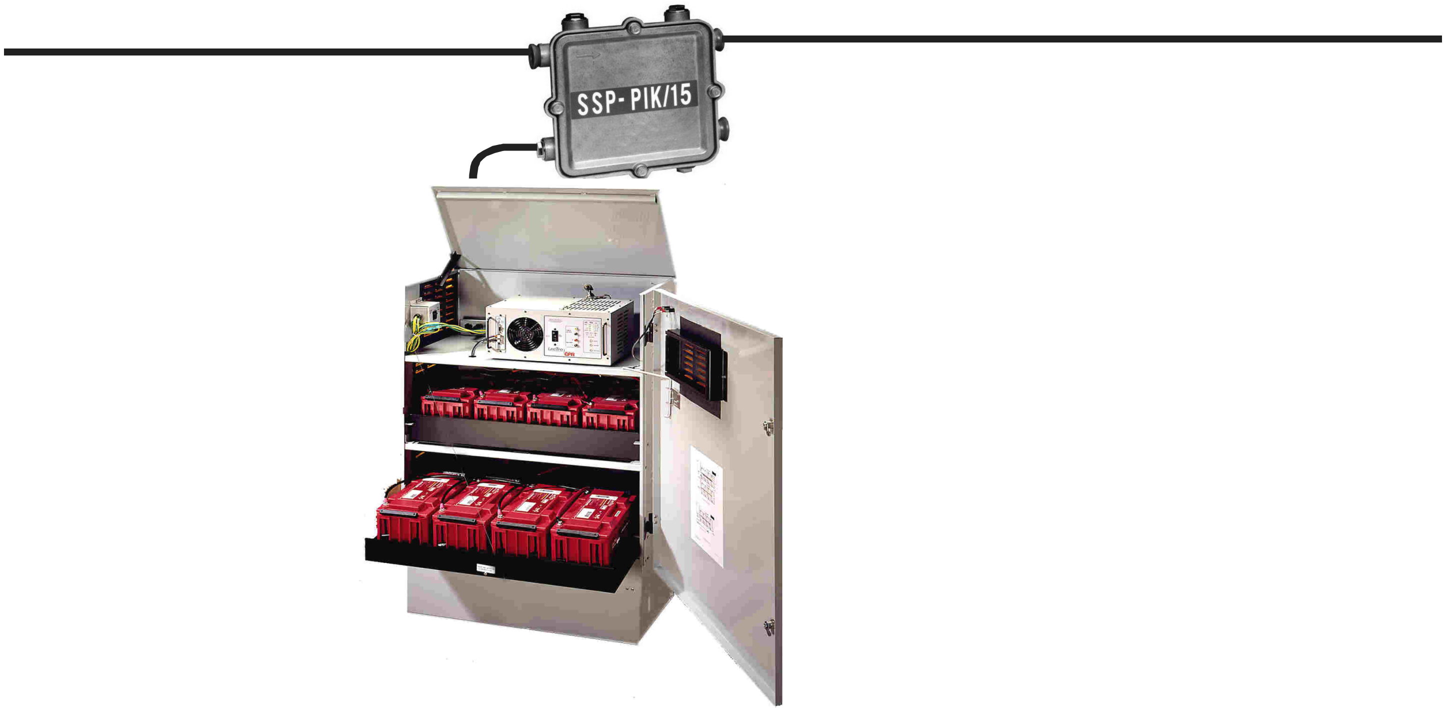


Passive Equipment in a Broadband System

The Power Inserter is the junction between the coaxial system and the power supply, it introduce 60 or 90 Volts AC from the Power Supply.

The Power Inserter are usually capable of handling 20 amperes.

Fuses can be installed on each leg for better protection.



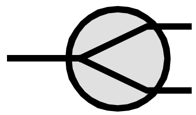
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Passive Equipment in a Broadband System

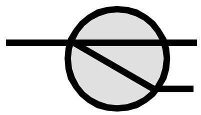
RF splitter and coupler function are to distribute RF signal from one coaxial cable to two or more coaxial cables. The frequency range is 5 to 1000 MHz.

- **Splitter devise signal evenly. 50% x 50% in both legs.**
- **Coupler devise signal unevenly, 10% x 90%, 20%X80, 40%X60%.**

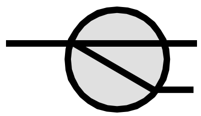
- **3N Splitter : 4.6 X 4.6 dB loss**



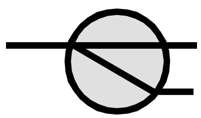
7N Coupler: 3.4 X 8.4 dB loss



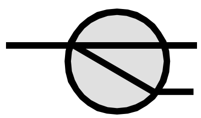
9N coupler: 2.4 X 9.7 dB loss



12N Coupler: 2.0 X 12.7 dB loss



16N Coupler : 1.9 X 16.6 dB loss

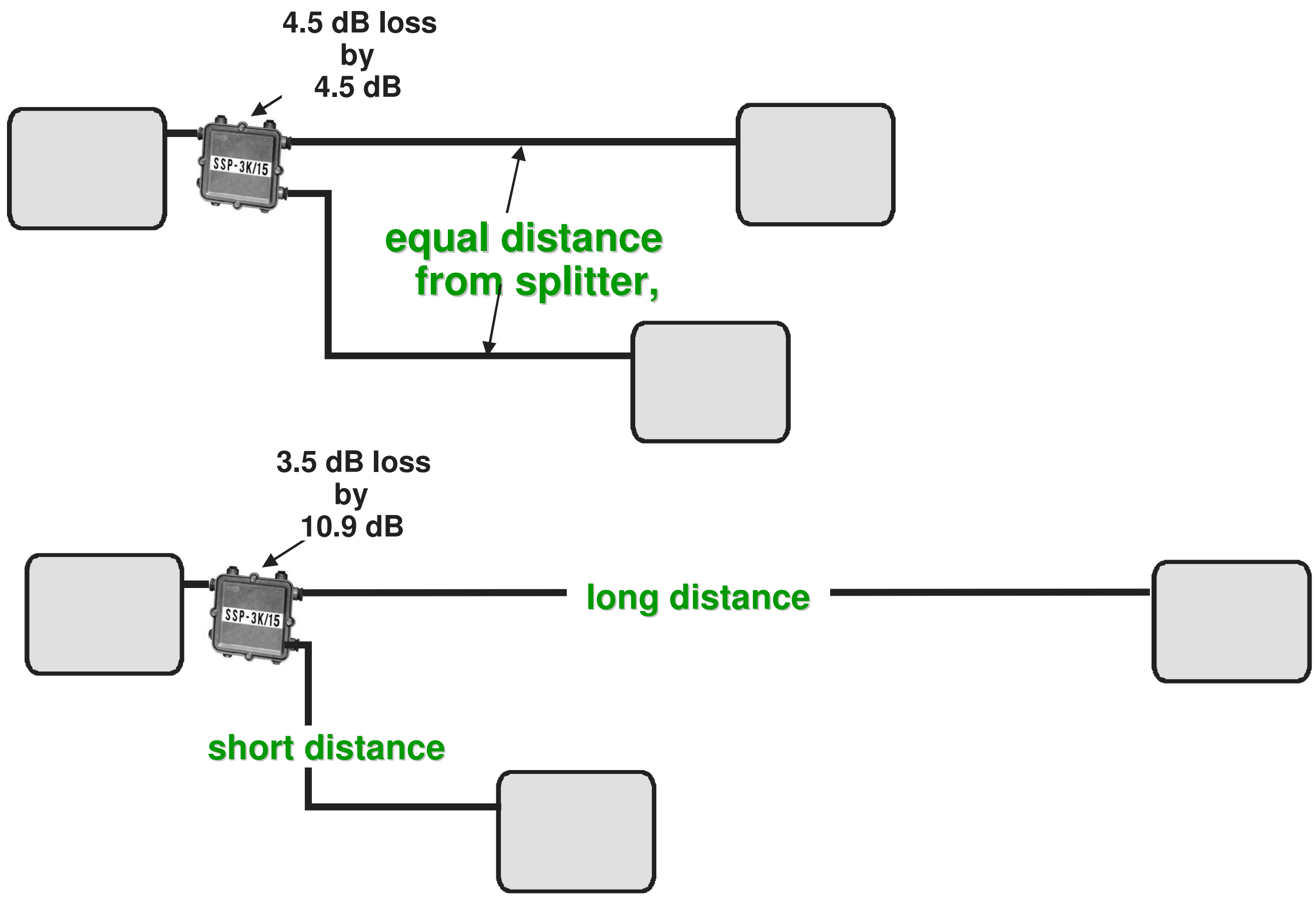




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Passive Equipment in a Broadband System

Utilisation of a RF splitter and a RF coupler.



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Passive Equipment in a Broadband System

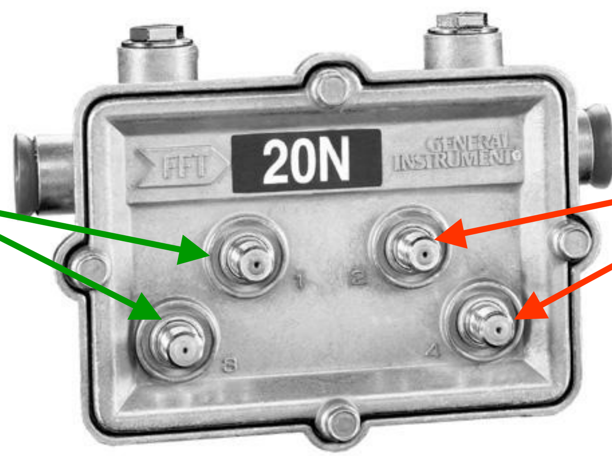
The Multitap function is to attached the customer drop to the Broadband System. Multitap comes equipped with; **2, 4 or 8 output**. The output level at each outlet on a modern system should be between; **14 to 16 dBmV**

The thru loss of a multitap depends on his value, the higher the value of the multitap, the less is the insertion loss.

They come in the following values:

35.0, 32.0, 29.0, 26.0, 23.0, 20.0, 17.0, , 14.0, 12.0, 10.5, 10.0, 7.5

Where the customer Installation goes.



14 to 16 dBmV

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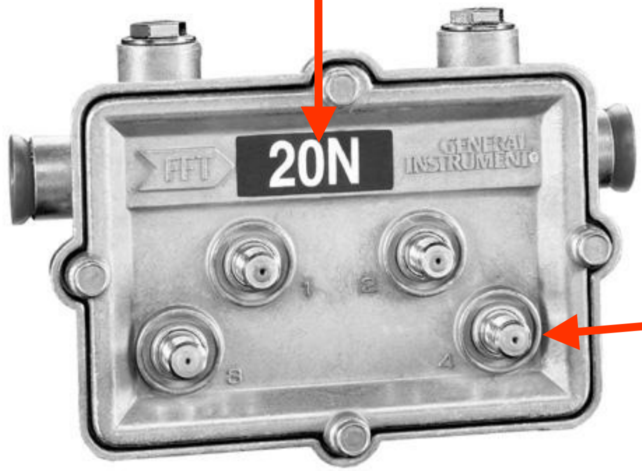
Passive Equipment in a Broadband System

Example of the input signal required and the thru loss at a multitap supplying: <u>+ 14.0 dBmV</u> level at the customer's drop.

Thru loss of the multitap: 1.7 dB @ 870 MHz

Input Level: 34.0 dBmV

Output Level: 32.3 dBmV



14 dBmV output
At 870 MHz.

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Passive Equipment in a Broadband System

Tap Specifications.

2 Outputs Model

Model	5-MHz	50-MHz	450-MHz	550-MHz	750-MHz	870-MHz	1000-MHz
4TN -	-	-	-	-	-	-	
7N	3.4	3.3	3.9	4.2	4.3	4.5	4.7
10N	1.7	1.3	1.3	1.8	2.2	2.5	3.2
12N	1.4	1.0	1.5	1.6	1.9	2.4	2.7
14N	1.1	0.9	1.3	1.3	1.6	1.9	2.2
17N	1.0	0.9	1.2	1.2	1.5	1.7	2.0
20N	0.6	0.5	0.9	1.1	1.3	1.6	1.9
23N	0.3	0.3	0.8	0.9	1.3	1.4	1.8
26N	0.3	0.3	0.9	0.9	1.3	1.4	1.8
29N	0.3	0.3	0.8	0.9	1.3	1.4	1.8
32N	0.3	0.3	0.8	0.9	1.3	1.4	1.8
35N	0.3	0.3	0.8	0.9	1.3	1.4	1.8

Passive Equipment in a Broadband System

Tap Specifications.

4 Outputs Model

Model	5-MHz	50-MHz	450-MHz	550-MHz	750-MHz	870-MHz	1000-MH
7N	-	-	-	-	-	-	-
10N	3.3	3.3	3.3	4.0	4.1	4.3	4.2
14N	1.6	1.3	1.9	1.9	2.4	2.6	3.2
17N	1.1	1.4	1.3	1.3	1.7	2.1	2.6
20N	0.5	0.9	1.4	1.2	1.5	1.7	2.1
23N	0.6	0.5	1.0	1.1	1.3	1.6	1.9
26N	0.3	0.3	0.8	0.9	1.3	1.4	1.9
29N	0.3	0.3	0.9	0.9	1.3	1.4	1.9
32N	0.3	0.3	0.8	0.9	1.3	1.4	1.9
35N	0.3	0.3	0.8	0.9	1.3	1.4	1.9

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Passive Equipment in a Broadband System

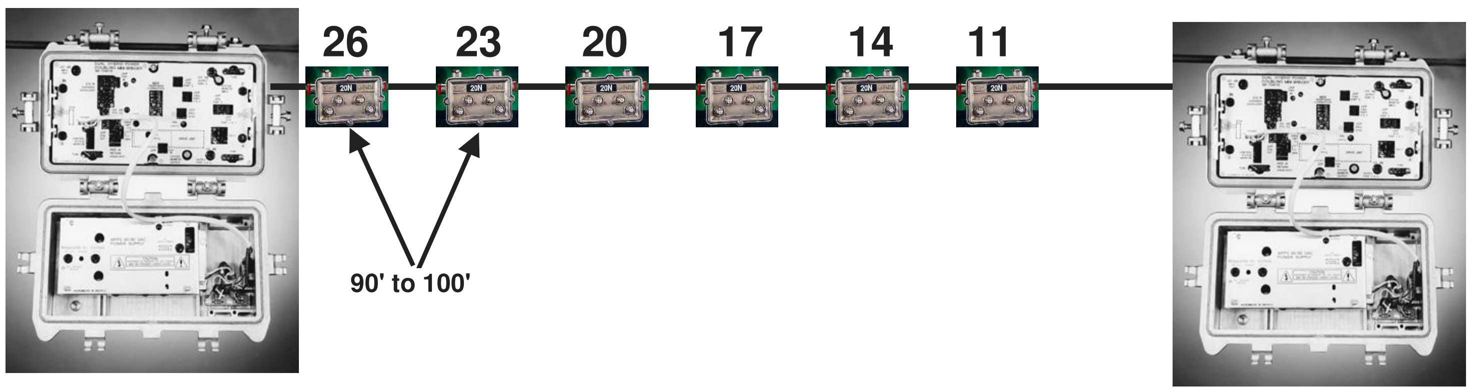
Tap Specifications.

8 Outputs Model

Model	5-MHz	50-MHz	450-MHz	550-MHz	750-MHz	870-MHz	1000-MH
10N	-	-	-	-	-	-	-
14N	3.9	3.4	3.3	4.0	4.0	4.6	5.0
17N	1.8	1.8	1.9	2.3	2.7	2.8	3.5
20N	1.2	1.4	1.3	1.5	1.9	2.1	2.6
23N	1.0	0.9	1.2	1.2	1.5	1.7	2.1
26N	0.6	0.5	1.0	1.1	1.3	1.6	2.0
29N	0.3	0.3	0.8	0.9	1.3	1.4	1.9
32N	0.3	0.3	0.9	0.9	1.3	1.4	1.9
35N	0.3	0.3	0.8	0.9	1.3	1.4	1.9

Passive Equipment in a Broadband System

Typical multitap installation between two RF amplifiers.

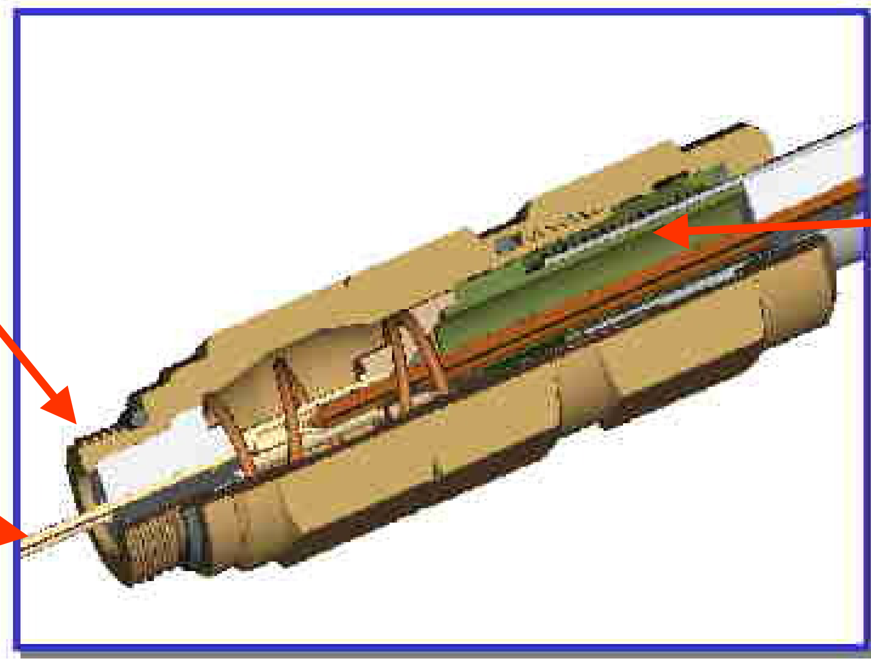


Multitaps are placed about 90 to 100 feet apart in most system. Notice that we never install a multitap at the input of an RF amplifier.

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Passive Equipment in a Broadband System

Coaxial connectors are a vital part of the CATV system. They connect all the active and passive equipment to the coaxial cable system. They require special tool to be connected to the cable, so they won't cause the signal to leak out of the cable or let outside signal get in the Broadband system.



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Passive Equipment in a Broadband System

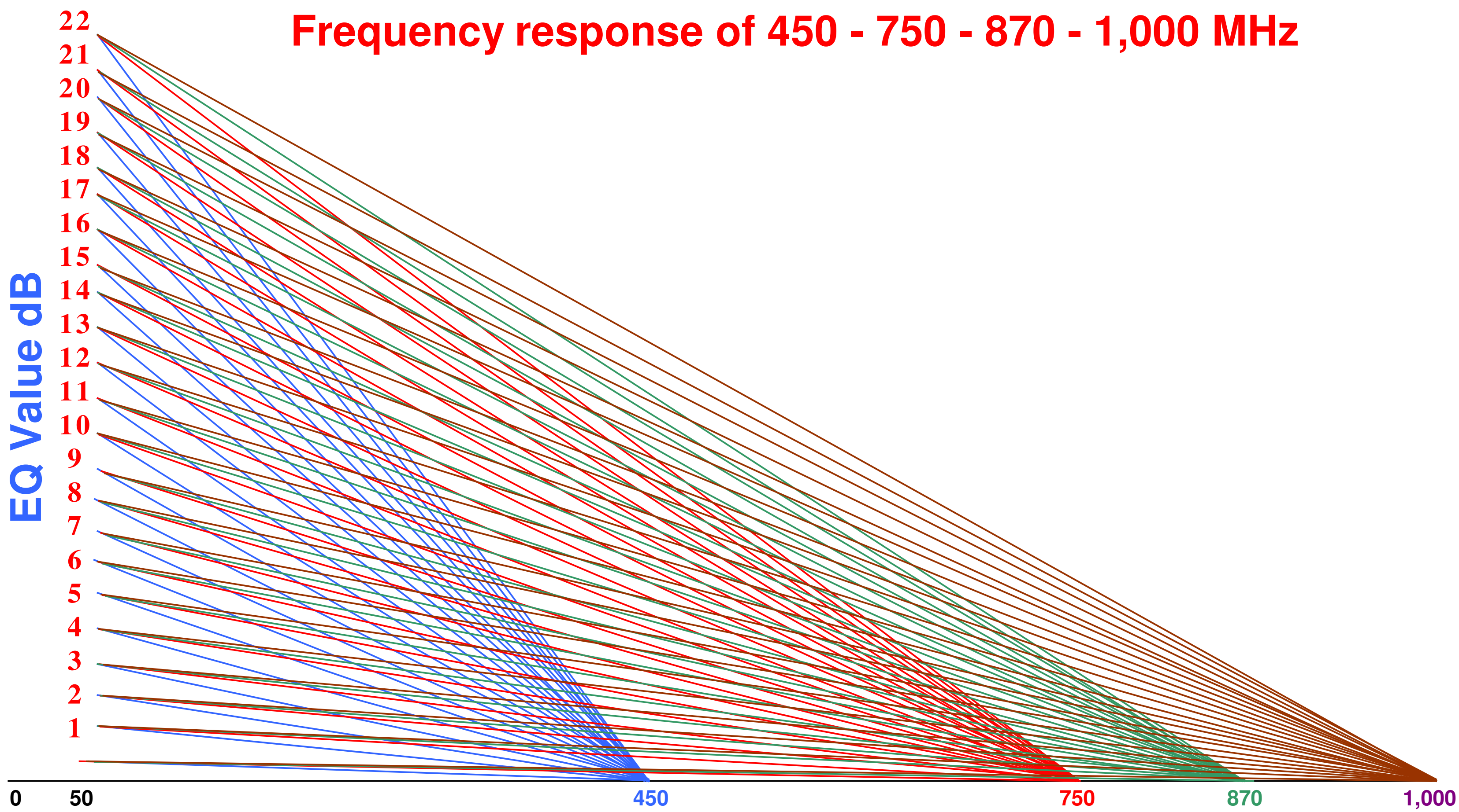
Signal equalizer is the first piece of equipment installed in all RF amplifier. Their main function is to bring all the signal to a flat input before these signals are amplified.



There are two thing required for a proper Equalizer, the first one been, the right system frequency for the system and the second one been, the right value of equalization.

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Passive Equipment in a Broadband System



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Passive Equipment in a Broadband System

Insertion of 50 - 1000 MHz Equalizer

SFE-100-* Slope Chart

Frequency (MHz) vs Insertion Loss (dB)										
SFE Value	SFE Slope	50	200	300	450	550	650	750	870	1003
SFE-100-*										
22	17.1	18.1	13.2	11.0	8.3	6.7	5.3	4.0	2.5	1.0
21	16.3	17.3	12.6	10.5	7.9	6.4	5.1	3.8	2.4	1.0
20	15.5	16.5	12.1	10.1	7.6	6.2	4.9	3.7	2.4	1.0
19	14.8	15.8	11.5	9.6	7.3	5.9	4.7	3.6	2.3	1.0
18	14.0	15.0	11.0	9.2	6.9	5.7	4.5	3.4	2.2	1.0
17	13.2	14.2	10.4	8.7	6.6	5.4	4.3	3.3	2.2	1.0
16	12.4	13.4	9.9	8.2	6.3	5.2	4.1	3.2	2.1	1.0
15	11.7	12.7	9.3	7.8	6.0	4.9	3.9	3.0	2.0	1.0
14	10.9	11.9	8.7	7.3	5.6	4.6	3.7	2.9	2.0	1.0
13	10.1	11.1	8.2	6.9	5.3	4.4	3.5	2.8	1.9	1.0
12	9.3	10.3	7.6	6.4	5.0	4.1	3.3	2.6	1.8	1.0
11	8.5	9.5	7.1	6.0	4.6	3.9	3.1	2.5	1.8	1.0
10	7.8	8.8	6.5	5.5	4.3	3.6	2.9	2.4	1.7	1.0
9	7.0	8.0	6.0	5.1	4.0	3.3	2.8	2.2	1.6	1.0
8	6.2	7.2	5.4	4.6	3.6	3.1	2.6	2.1	1.5	1.0
7	5.4	6.4	4.9	4.2	3.3	2.8	2.4	1.9	1.5	1.0
6	4.7	5.7	4.3	3.7	3.0	2.6	2.2	1.8	1.4	1.0
5	3.9	4.9	3.8	3.3	2.7	2.3	2.0	1.7	1.3	1.0
4	3.1	4.1	3.2	2.8	2.3	2.0	1.8	1.5	1.3	1.0
3	2.3	3.3	2.7	2.4	2.0	1.8	1.6	1.4	1.2	1.0
2	1.6	2.6	2.1	1.9	1.7	1.5	1.4	1.3	1.1	1.0
1	0.8	1.8	1.6	1.5	1.3	1.3	1.2	1.1	1.1	1.0
0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Passive Equipment in a Broadband System

Insertion loss of 50 - 750 & 870 MHz Equalizer

SFE-75-* Slope Chart

Frequency (MHz) vs Insertion Loss (dB)								
SFE Value	SFE Slope	50	200	300	450	550	650	750
SFE-75-*								
22	16.3	17.3	11.6	9.1	6.0	4.2	2.5	1.0
21	15.6	16.6	11.2	8.7	5.7	4.0	2.5	1.0
20	14.8	15.8	10.7	8.4	5.5	3.9	2.4	1.0
19	14.1	15.1	10.2	8.0	5.3	3.7	2.3	1.0
18	13.4	14.4	9.7	7.6	5.1	3.6	2.2	1.0
17	12.6	13.6	9.2	7.2	4.8	3.4	2.2	1.0
16	11.9	12.9	8.7	6.9	4.6	3.3	2.1	1.0
15	11.1	12.1	8.3	6.5	4.4	3.2	2.0	1.0
14	10.4	11.4	7.8	6.1	4.2	3.0	2.0	1.0
13	9.6	10.6	7.3	5.8	3.9	2.9	1.9	1.0
12	8.9	9.9	6.8	5.4	3.7	2.7	1.8	1.0
11	8.2	9.2	6.3	5.0	3.5	2.6	1.8	1.0
10	7.4	8.4	5.8	4.7	3.3	2.4	1.7	1.0
9	6.7	7.7	5.4	4.3	3.0	2.3	1.6	1.0
8	5.9	6.9	4.9	3.9	2.8	2.1	1.6	1.0
7	5.2	6.2	4.4	3.9	2.8	2.1	1.6	1.0
6	4.5	5.5	3.9	3.2	2.4	1.9	1.4	1.0
5	3.7	4.7	3.4	2.8	2.1	1.7	1.3	1.0
4	3.0	4.0	2.9	2.5	1.9	1.6	1.3	1.0
3	2.2	3.2	2.5	2.1	1.7	1.4	1.2	1.0
2	1.5	2.5	2.0	1.7	1.5	1.3	1.1	1.0
1	0.7	1.7	1.5	1.4	1.2	1.1	1.1	1.0

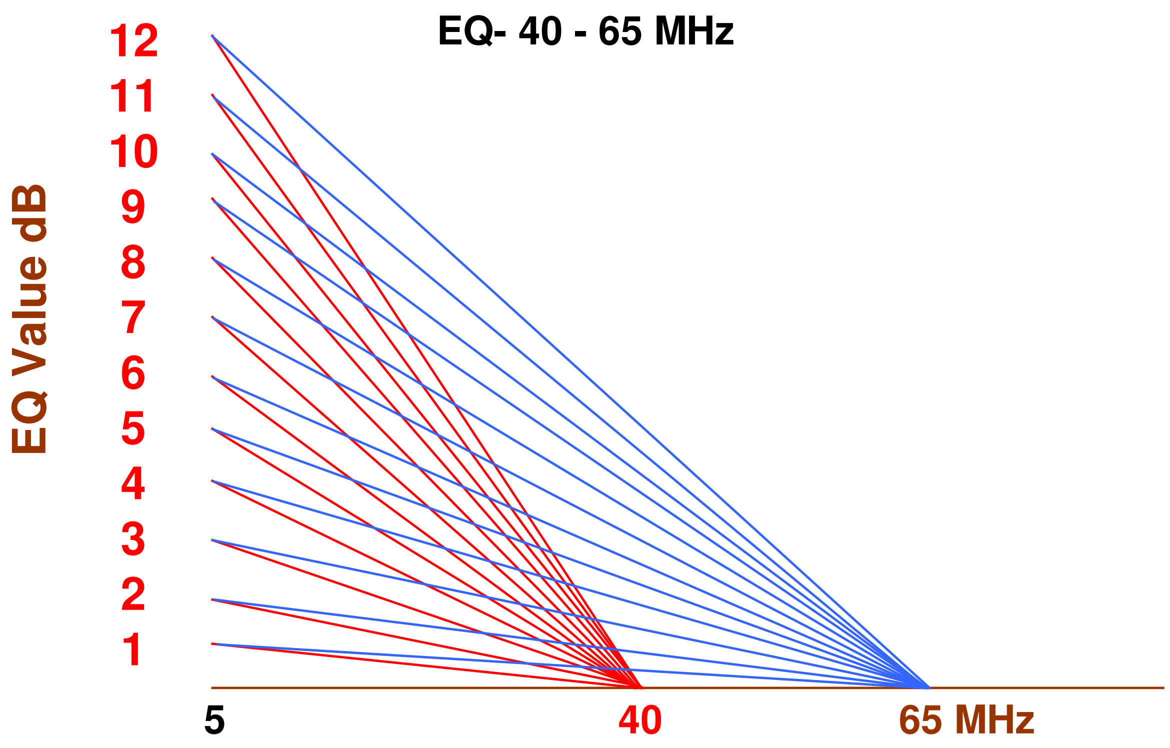
SFE-87-* Slope Chart

Frequency (MHz) vs Insertion Loss (dB)									
SFE Value	SFE Slope	50	200	300	450	550	650	750	870
SFE-87-*									
22	16.7	17.7	12.5	10.1	7.2	5.5	4.0	2.6	1.0
21	16.0	17.0	11.9	9.7	6.9	5.3	3.8	2.5	1.0
20	15.2	16.2	11.4	9.3	6.6	5.1	3.7	2.4	1.0
19	14.4	15.4	10.9	8.8	6.3	4.9	3.6	2.4	1.0
18	13.7	14.7	10.4	8.4	6.1	4.7	3.4	2.3	1.0
17	12.9	13.9	9.8	8.0	5.8	4.5	3.3	2.2	1.0
16	12.2	13.2	9.3	7.6	5.5	4.3	3.2	2.1	1.0
15	11.4	12.4	8.8	7.2	5.2	4.1	3.0	2.1	1.0
14	10.6	11.6	8.3	6.8	4.9	3.9	2.9	2.0	1.0
13	9.9	10.9	7.8	6.4	4.7	3.7	2.8	1.9	1.0
12	9.1	10.1	7.2	6.0	4.4	3.5	2.6	1.9	1.0
11	8.4	9.4	6.7	5.5	4.1	3.3	2.5	1.8	1.0
10	7.6	8.6	6.2	5.1	3.8	3.0	2.4	1.7	1.0
9	6.8	7.8	5.7	4.7	3.5	2.8	2.2	1.6	1.0
8	6.1	7.1	5.2	4.3	3.2	2.6	2.1	1.6	1.0
7	5.3	6.3	4.6	3.9	3.0	2.4	1.9	1.5	1.0
6	4.6	5.6	4.1	3.5	2.7	2.2	1.8	1.4	1.0
5	3.8	4.8	3.6	3.1	2.4	2.0	1.7	1.4	1.0
4	3.0	4.0	3.1	2.7	2.1	1.8	1.5	1.3	1.0
3	2.3	3.3	2.6	2.2	1.8	1.6	1.4	1.2	1.0
2	1.5	2.5	2.0	1.8	1.6	1.4	1.3	1.1	1.0
1	0.8	1.8	1.5	1.4	1.3	1.2	1.1	1.1	1.0

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Passive Equipment in a Broadband System

Frequency response of 5 - 40 & 65 MHz Equalizer



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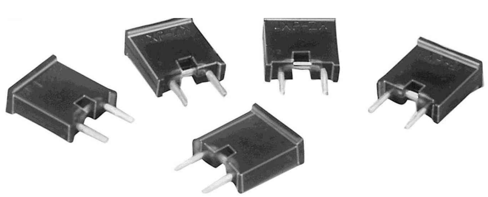
Passive Equipment in a Broadband System

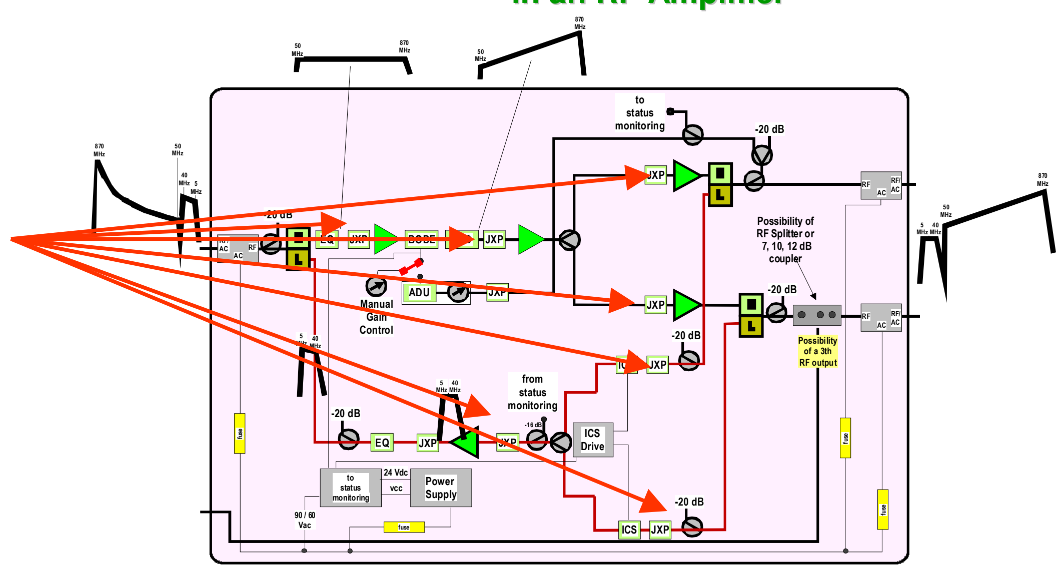
Fixed attenuators are also called attenuation “PAD”. There function is to reduce RF level to get the RF amplifier to operates in their proper range. Even with the installation of PAD, the final adjustment of an amplifier should always be done with a variable GAIN, a TLC or AGC control.

•Depending on the type of amplifiers used, some pad comes in values of 3, 6, 9, 12 and 15 dB, some other suppliers will supply PAD from 0 to 25 dB in one dB step.

Where PAD can be placed in an RF Amplifier

Different PAD Values





TEST!

Name two types of Power Supply.

What is called the piece that goes between the Power supply and the cable system.

What is the right output value of a multitap.

How many batteries are required on Stand-by- Power Supply.

What is UPS stand for.

What is the main function of a cable equalizer.

What are the Pad main function in an RF amplifier.

The end of this seminar.